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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/531,553

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Vitali Nesterenko

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GREER, BURNS & CRAIN
300 S WACKER DR
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CHICAGO, IL 60606

EXAMINER

STARK, JARRETT J

ART UNIT

PAPER NUMBER

2823

MAIL DATE

DELIVERY MODE

11/04/2008

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/531,553

Applicant(s)

NESTERENKO ET AL.

Examiner

JARRETT J. STARK

Art Unit

2823

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 08 September 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-946)
- 3) ☐ Information Disclosure Statement(s) (PTO/SE/US)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION
Response to Arguments

Regarding arguments directed to claims 1-6, 14, 16 and 17 are rejected under 35 U.S.C. 102(b) as being anticipated by Schilling et al.

Applicant's arguments filed 9/8/2008 have been fully considered but they are not persuasive.

Applicants argue Schilling et al. does not teach that the wafer is a semiconductor wafer as disclosed in the specification.

In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., semiconductor wafer) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

It is additionally noted "wafer" is merely a structural limitation which does not manipulatively distinguish the claim method from the prior art of record. Structural Elements recited in the claim must manipulatively distinguish the claim from the prior art to have patentable weight.

"To be entitled to patentable weight in method claims, the recited structural limitations therein must affect the method in a manipulative sense and not amount to mere claiming of a use of a particular structure."

Ex parte Pfeiffer, 135 USPQ 31,k 33 (Bd. Pat. App & Inter. 1961). Put another way, "patentability of a method claim must rest on the method steps recited, not on the structure used, unless that structure affects the method steps." *Leesona Corp. v. U.S.*, 185 USPQ 156, 165 (Ct. Cl. Trial iv. 1975) *aff'd* 192 USPQ 672 (Ct. Cl 1976).

In the instant example, Schilling teaches the method of bonding the surfaces of two objects together by first cleaning the surfaces and then applying heat and isostatic pressure in order to thermally bond the objects. It is understood that the process is not limited to a specific shape, thus the process disclosed by Shilling is equally capable of bonding a "wafer" shaped object.

Schilling et al. is silent upon incorporating any other pressure other than hot isostatic pressure, therefore it is understood Schilling discloses only/solely using isostatic pressure.

Regarding arguments directed to claims rejected under 35 U.S.C. 103(a) as being unpatentable over Bhat et al. (US 5,207,864) in view of Benavides et al. (US 6,443,179 B1) and/or Curbishley et al. (US 4,587,700).

Applicant's arguments with respect to the claims have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-6, 14, 16 and 17 are rejected under 35 U.S.C. 102(b) as being anticipated by Schilling et al. (US 3,952,939).

Regarding claim 1, Schilling et al. discloses a method for wafer bonding, the method comprising steps of:

providing wafers to be bonded (Schilling, Abstract);

cleaning the wafers to remove particle and chemical contaminants from bonding surfaces of the wafers (Schilling, Col. 2 lines 60-61);

bringing the bonding surfaces of the wafers together to weakly bond the wafers to each other (Schilling, Abstract);

placing the wafers in a pressurization chamber (Schilling, Abstract);
solely through isostatic pressure, applying bonding pressure to the wafers (Schilling, Abstract);

heating the wafers during said step of applying bonding pressure (Schilling, Abstract); and

controlling and maintaining said steps of heating and applying bonding pressure for a period of time to substantially strengthen bonding between the wafers (Schilling, Abstract).

Regarding claim 2, Schilling et al. discloses the method of claim 1, further comprising steps of: cooling the wafers; and removing the wafers from the pressurization chamber (Schilling, Abstract);

Regarding claim 3, Schilling et al. discloses the method of claim 2, wherein said step of cooling is conducted while said step of controlling and maintaining continues said step of applying bonding pressure, followed by a step of depressurization (Schilling, Fig. 3).

Regarding claim 4, Schilling et al. discloses the method of claim 1, wherein said step of controlling and maintaining comprises: creating a temperature ramp and a pressure ramp to substantially strengthen bonding between the wafers (Schilling, Entire document—the process disclosed by Schilling is “to improve bonding” which implicitly mean to strengthen bonding);

Regarding claim 5, Schilling et al. discloses the method of claim 4, wherein said step of controlling and maintaining creates the temperature ramp as a function that is independent from the pressure ramp (Schilling, Fig. 3).

Regarding claim 6, Schilling et al. discloses the method of claim 1, wherein said step of heating commences prior to said step of applying pressure (Schilling, Fig. 3).

Regarding claim 14, Schilling et al. discloses the method of claim 1, further comprising, immediately prior to said step of applying and said step of heating, purging the pressurization chamber (Schilling, Abstract and Fig. 3).

Regarding claim 16, Schilling et al. discloses the method according to claim 15, wherein the pressurization chamber comprises a hot isostatic press (Schilling, Abstract and Fig. 3).

Regarding claim 17, Schilling et al. discloses the method of claim 1, wherein said step of heating commences with or after said step of applying pressure (Schilling, Fig. 3).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the

invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bhat et al. (US 5,207,864) in view of Cohn et al. (US 7,276,789 B1) in further view of Applicant's Admitted Prior Art (AAPA – PGPUB paragraphs [0001-8]).

Regarding claim 1, 11, 12, 14-16, 19, Bhat et al. discloses a method for wafer bonding, the method comprising steps of:

providing wafers to be bonded (Bhat, Abstract);

cleaning the wafers to remove particle and chemical contaminants from bonding surfaces of the wafers (Bhat, Abstract);

bringing the bonding surfaces of the wafers together to weakly bond the wafers to each other (Bhat, Abstract);

placing the wafers in a pressurization chamber (Bhat, Abstract);

applying bonding pressure to the wafers (Bhat, Abstract);

heating the wafers during said step of applying bonding pressure (Bhat, Abstract); and

controlling and maintaining said steps of heating and applying bonding pressure for a period of time to substantially strengthen bonding between the wafers (Bhat, Abstract);

Bhat et al. does not specify that the pressure is applied solely through isostatic pressure. It was however known to those of ordinary skill in the art to solely apply an

isostatic type of pressure when bonding wafers. At the time of the invention it was conventional use hot press bonding as well as Hot Isostatic Press or Hot Isostatic Processing (HIP) diffusion bonding. HIP is known conventional means of applying evenly controlled pressure. It would be obvious to one of ordinary skill in the art to select isostatic means for applying pressure when bonding wafers. For an examples of one of ordinary skill in the art applying isostatic pressure when performing a diffusion bonding process see Cohn et al. (entire document).

"Still another alternative for supplying the necessary pressure and heat is to place a substrate pair into a high-temperature bag (made of a material such as polyimide or metal foil) and subject it to hot -isostatic-pressing."

It would have been within the scope of one of ordinary skill in the art at the time of the invention to combine the teachings of Bhat and Cohn to enable the pressure step of Bhat to be performed according to the teachings of Cohn because one of ordinary skill would have been motivated to look to alternative suitable methods of performing the disclosed pressure step of Bhat and art recognized suitability for an intended purpose has been recognized to be motivation to combine. MPEP § 2144.07.

When there is a design need or market pressure to solve a problem and there are a finite number of identified, predictable solutions, a person of ordinary skill in the art has good reason to pursue the known options within his or her technical grasp. If this leads to the anticipated success, it is likely the product not of innovation but of ordinary skill and common sense. KSR Int'l Co v. Teleflex Inc.

Regarding claim 2, Bhat_in view of Cohn in further view of AAPA disclose the method of claim 1, further comprising steps of: cooling the wafers; and removing the wafers from the pressurization chamber (Bhat, Col. 6 line 10).

Regarding claim 3, Bhat_in view of Cohn in further view of AAPA disclose the method of claim 2, wherein said step of cooling is conducted while said step of controlling and maintaining continues said step of applying bonding pressure, followed by a step of depressurization (Bhat, Abstract).

Regarding claim 4, Bhat_in view of Cohn in further view of AAPA disclose the method of claim 1, wherein said step of controlling and maintaining comprises: creating a temperature ramp and a pressure ramp to substantially strengthen bonding between the wafers (Bhat, Entire document—the process disclosed by Bhat is to improve bonding which implicitly mean to strengthen bonding);

Regarding claim 5, Bhat_in view of Cohn in further view of AAPA disclose the method of claim 4, wherein said step of controlling and maintaining creates the temperature ramp as a function that is independent from the pressure ramp (Bhat, Abstract).

Regarding claim 6, Bhat in view of Cohn in further view of AAPA disclose the method of claim 1, wherein said step of heating commences prior to said step of applying pressure (Bhat, Abstract).

Regarding claim 7, Bhat in view of Cohn in further view of AAPA disclose the method of claim 1, wherein said step of heating commences with or after said step of applying pressure (Bhat, Abstract).

Regarding claim 8, Bhat in view of Benavides and/or Curbishley in further view of AAPA disclose the method of claim 1, wherein said step of cleaning creates hydrogen terminated surfaces at the bonding surfaces (Inherent result of HF dip).

Regarding claim 9, Bhat in view of Cohn in further view of AAPA disclose the method of claim 1, wherein said step of bringing creates one of a Van der Waals and Hydrogen bond (Bhat, Abstract).

Regarding claims 10 and 13, Bhat in view of Cohn in further view of AAPA disclose the method of claim 9, wherein said step of bringing brings the bonding surfaces into direct contact with each other with or without an intervening layer (direct and indirect bonding are known in that art. The selection of the two types of bonding, indirect or direct bonding, is a matter of design choice which is dependent upon the materials which are being bonded. One of ordinary skill in the art would be able to

select one of the two known process on the base of its suitability (For support see AAPA PG PUB paragraph [0004]).

Regarding claim 17, Bhat in view of Cohn in further view of AAPA disclose the method of claim 1, wherein said steps of providing, cleaning and bringing are repeated to form a plurality of weakly bonded pairs of wafers and said steps of applying, heating, and controlling and maintaining are carried out with the plurality of weakly bonded pairs of wafers simultaneously in the pressurization chamber (Bhat, Abstract).

Regarding claim 18, Bhat in view of Cohn in further view of AAPA disclose the method of claim 1, further comprising, prior to said step of placing, loading said wafers in an unsealed container, and wherein said step of placing is carried out by placing said unsealed container in said pressurization chamber (Bhat, Abstract).

Regarding claim 20, Bhat in view of Cohn in further view of AAPA disclose the method of claim 19, further comprising a step of controlling said heating and pressing to induce strain in at least one of said wafers (inherent result of heat/pressure bonding process).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JARRETT J. STARK whose telephone number is

(571)272-6005. The examiner can normally be reached on Monday - Thursday 7:00AM - 5:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew Smith can be reached on (571) 272-1907. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

10/31/2008
/Jarrett J Stark/
Examiner, Art Unit 2823